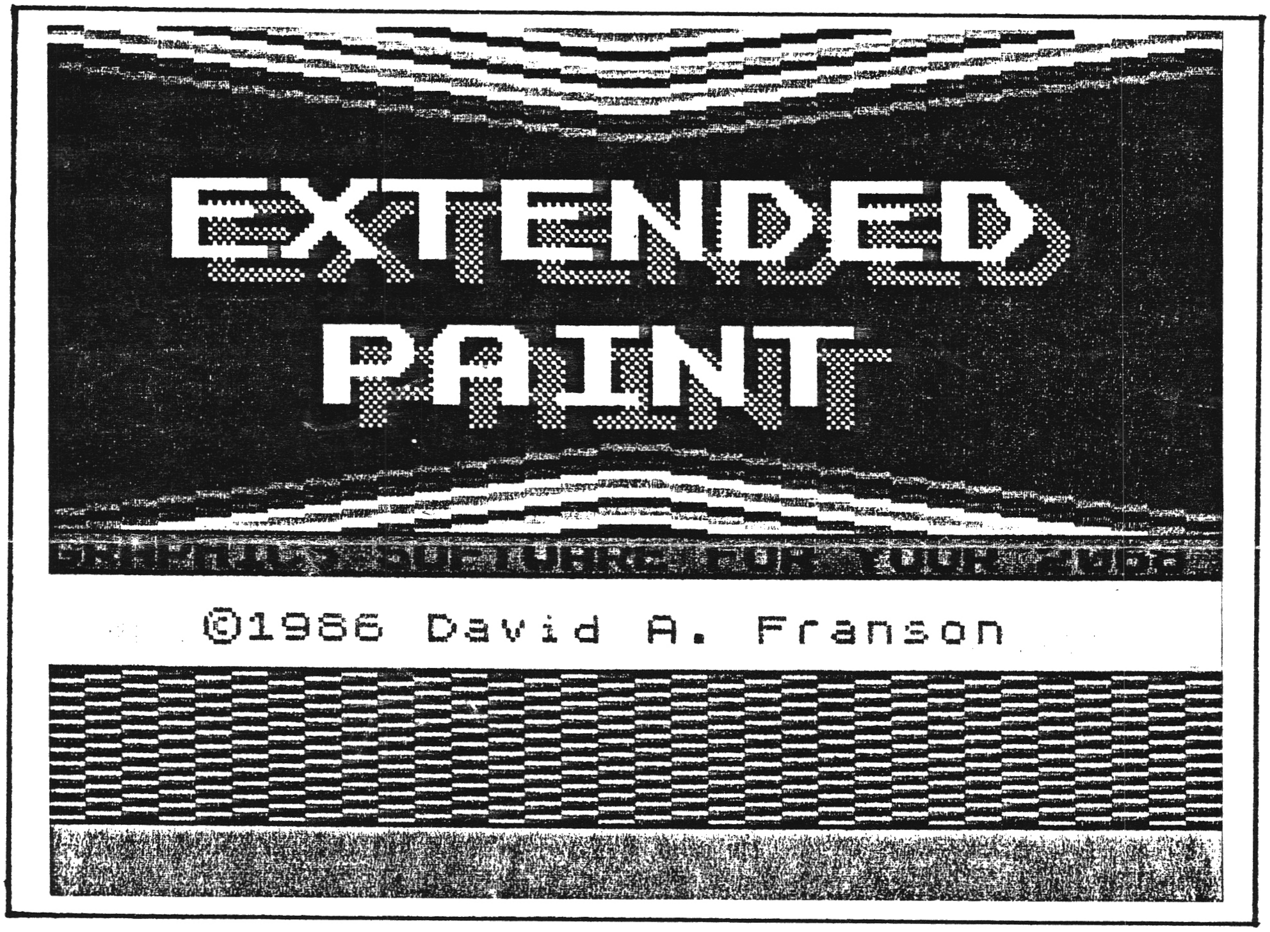
EXTENDED PAINT USER MANUAL



EXTENDED PAINT

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EXTENDED PAINT
Program and Documentation
written by David A. Franson
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Address all comments (encouraged!!) and inquiries to:

David A. Franson
3534A E. Squire Ave.
Cudahy, WI 53110

Preface

Extended Paint is my attempt to implement the TS2068's extended color mode in an easy-to-use and effective manner. I wrote the original version of Extended Paint in 1984, mostly out of curiousity as to what the TS2068's extended color mode was all about. The original version was much too slow because I wrote it almost entirely in BASIC; this current version makes extensive use of machine code routines to speed things up and implement several new features.

I enhanced Extended Paint and decided to release it commercially after realizing that no software currently on the market uses the TS2068's extended color mode in an effective manner. Upgrading the program also offered an enormous personal challenge which I have found to be very rewarding.

I attempted to include all the features that I have found most useful in my extensive experimenting with the TS2068's extended color mode. I hope you find the features useful, and, above all, I hope you enjoy Extended Paint.

To use Extended Paint and this manual most effectively, please read the Introduction and the entire manual at least once through.

Before leading you further into Extended Paint, I'd like to pause for a few acknowledgements. First of all, to my wife Denise and my daughter Holly for their infinite patience, understanding, and encouragement. Secondly, to the Sinclair Milwaukee Users Group (S.M.U.G.) for the contagious enthusiasm of its membership, a great help in keeping alive my interest in TS computing. Finally, I'd like to thank all TS users and dealers for their continued success at keeping this remarkable line of computers alive and kicking.

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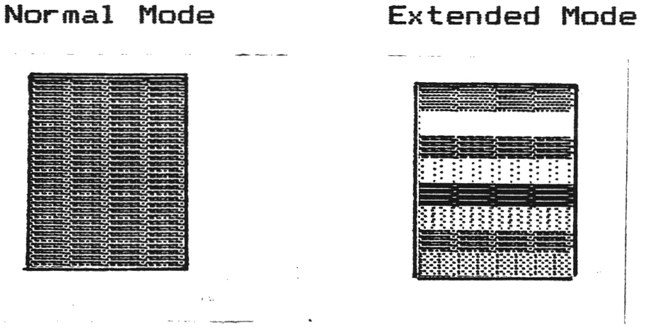
INTRODUCTION

What is Extended Paint?

Extended Paint is a graphics utility for the Timex/Sinclair 2068 that allows you to paint high-resolution colors onto an existing black & white screen image. Extended Paint is not a drawing program; it doesn't allow you to create lines, circles, shapes, and other black & white figures. Extended Paint is a tool that frees you from worrying about color clashes in your graphics, since Extended Paint offers you **EIGHT TIMES** the normal color resolution on the TS2068, by using the TS2068's extended color mode.

What is Extended Color Mode?

As mentioned above, the TS2068's extended color mode offers you eight times the normal color resolution. Specifically, the vertical color resolution increases by a factor of eight (see Figure 1). Normally, each byte of attribute (color) information corresponds to one character position on the screen. A character may have only one ink color, one paper color, it may flash (alternate between the paper and ink color), and it may be bright (appear with a higher intensity on the screen).


Normal Mode

Extended Mode

Figure 1: Normal vs Extended Color Mode

With extended color mode and Extended Paint, the same character position now has eight segments within it, each of which may flash, be bright, and have a different paper and ink color. For a screen full of characters, this may seem like an insignificant improvement. However, for high-resolution graphics, where the normal low color resolution often mars an otherwise effective design, the superior color resolution offered by extended color mode and Extended Paint allows you to overcome this problem.

With the eightfold increase in vertical color resolution, the TS2068's color resolution jumps from the normal 24x32 to a whopping 192x32. Note that the horizontal color resolution remains the same, at 32 positions across the screen. The low horizontal resolution still offers a small handicap to creating the perfect graphic on the 2068, but fortunately Extended Paint contains some features that allow you to minimize this handicap.

A Typical Session With Extended Paint

When creating or enhancing a graphic with Extended Paint, you are faced with three alternatives:

- You can create a purely color image with a resolution of 192x32, with no restrictions.
- You can create a purely color image with a resolution of 192x64, but you must pay attention to your use of the flash and bright attributes.
- You can add high resolution colors to an existing 192x256 resolution black & white image.

Let's expand on the last alternative, enhancing an existing black & white image. Here is a brief summary of the steps to follow:

1. Load the existing black & white screen into Extended Paint.
2. Determine the primary background color.
3. Determine any color patterns you want to paint onto the black & white image.
4. Apply the detailed color to the black & white image. This will comprise the majority of your work.
5. Resolve any color clashes.
6. Print a greytone image of the colored black & white image on either the TS2040 printer or a full-size Epson-compatible printer. -OR- print a full color image of the screen on the Canon PJ-1080A inkjet printer (or its compatibles).
7. Save the black & white image (you may have changed it when resolving color clashes).
8. Save the color screen.

The Remainder of this Manual

The following sections comprise the remainder of this manual:

- A reference list of all Extended Paint commands.
- A procedure that recounts the steps I used in creating the Extended Paint title screen. It covers the commonly-used Extended Paint commands.
- A section describing how you can use extended color mode, and graphics created with Extended Paint, in your own programs.

USING EXTENDED PAINT

To load Extended Paint, enter the command

```
LOAD ""
```

After the program loads, you'll see a blank screen with a flashing black & white cursor in the upper left corner. You're in Extended Paint's Immediate Mode, ready to use the program.

Extended Paint's many commands are accessed through Immediate Mode, the Main Menu, and three sub-menus. Figure 2 illustrates Extended Paint's menu hierarchy and the commands available from each point in the program.

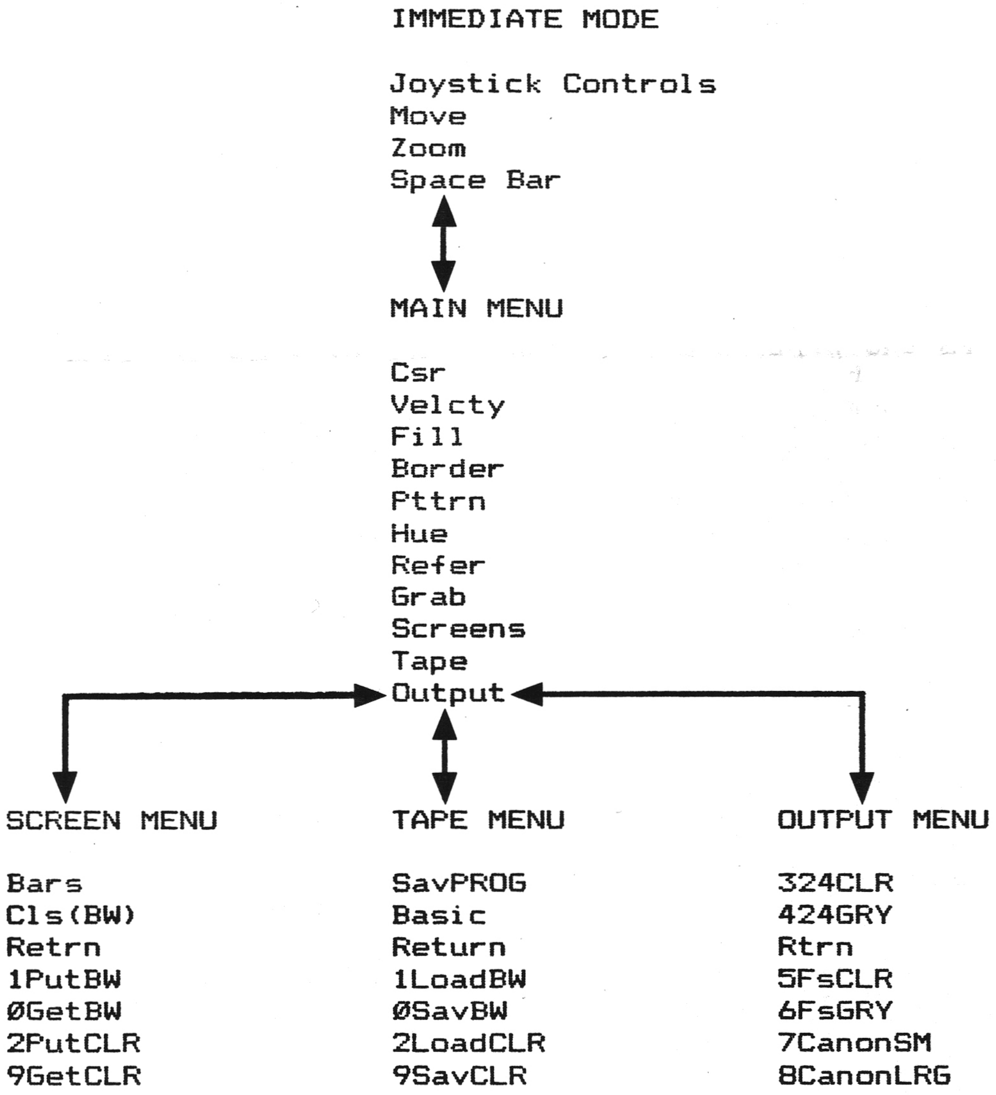


Figure 2: Extended Paint's Menu Hierarchy

Immediate Mode

Joystick Controls

Extended Paint requires that you have a joystick connected to the 2068's left joystick port. The joystick commands are listed below:

LEFT - Moves the cursor left one column. If the cursor begins at the left edge of the screen, stick left will move it to the right edge of the above row.

RIGHT - Moves the cursor right one column. If the cursor begins at the right edge of the screen, stick right will move it to the left edge of the below row.

UP - Moves the cursor up one row. If the cursor begins on the top row of the screen, stick up moves the cursor to the bottom row of the screen.

DOWN - Moves the cursor down one row. If the cursor begins on the bottom row of the screen, stick down moves the cursor to the top row of the screen.

BUTTON - Allows you to change the current paint color. A prompt appears at the bottom of the screen, asking you for the paper color. Enter the number (0 - 7) that corresponds to the paper color you desire. The color corresponding to each numeric value appears on the keyboard, above the number keys. For example, enter a "1" for blue. The prompt continues, asking you for the ink color. Enter a value, 1 - 7, as you did for the paper color. Next, the abbreviation "Br?" appears. Enter a "y" if you want the ink and paper colors to be bright. Finally, the abbreviation "Fl?" appears. Enter a "y" if you want the paper and ink color to alternately flash.

Note: Any value other than "y" in response to the "Br?" and "Fl?" prompts will turn off bright and flash.

Other Immediate Mode Commands

You can access the following Immediate Mode commands by pressing the designated key:

"m" - Move command. Allows you to move the cursor with the joysick to another place on the screen, without painting the areas you pass over. Press the "m" key again to return to Immediate Mode. A tone will sound when you first press the "m" key, and will sound once more when you press the "m" key to exit the Move option. If the situation ever arises where you can't seem to use any Immediate Mode commands, the most likely solution is that you chose the Move option but failed to exit it by pressing "m" again.

"z" - Zoom command. This command gives you an enlarged view of the black & white area you are currently adding colors to. You can then set or reset individual screen pixels, adding detail to the image, or, more likely, resolving any color clashes by adjusting what areas will appear as the ink or paper color. Move the cursor with the joystick (normal directional movement) and toggle the pixel (set or reset) with the joystick button. Press the "z" key again to exit the Zoom command and return to Immediate Mode.

Warning: Never BREAK the program when in the middle of the zoom command.

Space Bar - Press the space bar to access the Main Menu (and the sub-menus available from the Main Menu). Pressing the space bar when the Main Menu appears on the screen returns you to Immediate Mode.

By now you've probably noticed a neat feature of Extended Paint. You can work with all 24 lines of the screen! Although Extended Paint uses the last two lines of the screen to display menus and prompt you for input, Extended Paint saves the image of whatever's on the last two lines before printing over them.

Main Menu Commands

The Main Menu presents you with twelve commands you can give to Extended Paint (see Figure 3).

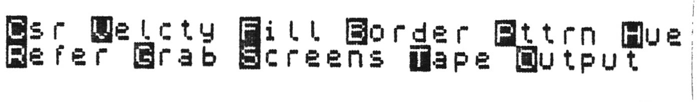

Csr Velcty Fill Border Pttrn Hue
Refer Grab Screens Tape Output

Figure 3: The Main Menu

Notice that the first character of each command (except for space bar) appears in inverse. The inverse character represents the key you must press to invoke the command. Notice also that most of the commands are abbreviated. This allows all the Main Menu commands to fit on only two lines. In the following command descriptions, the full name of the command appears immediately after the abbreviated command name. Also, the first character in the command name is underlined in the following command descriptions, rather than in inverse type as on the screen menu.

> **Note:** Throughout Extended Paint, all commands that involve input prompts can be aborted by entering an "s" at the first prompt. Also, pressing the "s" key during any of Extended Paint's printing functions, or while the Pttrn command is executing, will abort the command and return to the appropriate menu.

Csr - Cursor color. Allows you to change the color of the cursor to make it more visible within the current color background. The standard color input prompts appear (Paper? Ink? Br? Fl?).

Velcty - Velocity of cursor. Allows you to change the speed of cursor movement. Typically, you will slow down the cursor speed when you are doing delicate color work, and speed it up when you are painting large areas of the screen. Valid values are 1 (fast) through 15 (slow).

Fill - Fill the entire screen with one particular color. The standard color input prompts appear (Paper? Ink? Br? Fl?). Typically, you will use this command when beginning to create a color image or when enhancing a black & white image, defining the primary background colors. To fill a smaller section of the screen, use the Pttrn or Hue commands.

Border - Border. Allows you to change the current border color. Enter a value from 1 - 7, corresponding to the new border color you desire.

Pttrn - Pattern. Apply a color pattern to one or more screen thirds. Extended Paint will first prompt you for the screen thirds to apply the pattern to. See Figure 4.

Screen Third	From	To
Top Third	1	2
Middle Third	2	3
Bottom Third	3	4
Top and Middle	1	3
Middle & Bottom	2	4
Entire Screen	1	4

Figure 4: Screen Thirds Entry Table

Supply an offset value (0 - 3) at the "Offset?" prompt. Extended Paint will then prompt you with "Step?" Enter the desired step value (1 - 8), typically an odd number. Finally, the standard color input prompts appear (Paper? Ink? Br? Fl?). You can abort the pattern function by pressing the "s" key.

Example:

1. Press "p" to choose the Pattern command.
2. Specify the first screen third (from screen third 1 to screen third 2).
3. Enter "0" at the "Offset?" prompt.
4. Enter "3" at the "Step?" prompt.
5. Enter the colors of your choice.
6. The top third of the screen will fill with a pattern in the colors you specified.
7. Repeat the above steps, but this time enter "1" in response to the "Offset?" prompt and specify a different pattern color. The second color pattern will appear alongside the first color pattern you specified.

See the Example section at the end of this manual for a further example of how to use the Pattern command.

Note: If you enter "1" in response to the "Step?" prompt, you can fill individual screen thirds with a particular color.

Hue - Use this command to specify a particular color and change all of it's occurrences (paper or ink) to another color. The Hue command first prompts you for the screen third(s) affected, then asks if you want to change an ink or paper color. Enter "i" for ink or "p" for paper. It then asks what color you want to change and what color you want to change it to. Enter a value from 1 - 7, corresponding to the color above the key, in response to each of these prompts. The Hue command is particularly useful for experimenting with the primary color scheme of your graphic.

Refer - If you loaded an existing screen into Extended Paint that already had low resolution colors, this command allows you to refer to that low resolution color scheme to aid in applying high resolution colors. Press "r" again to return to the Main Menu.

Grab - This is one of Extended Paint's most powerful commands. If you loaded a screen into Extended Paint that already had low resolution colors, the Grab command will apply the same color scheme to your high resolution color screen. Useful if you like the color scheme of the low resolution colors, and merely want to resolve the color clashes using Extended Paint.

Screens- Screen Menu. This command takes you to the Screen Menu. See the summary of Screen Menu commands in this manual.

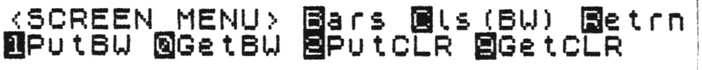
Tape - Tape Menu. This command takes you to the Tape Menu. See the summary of Tape Menu commands in this manual.

Output - Output Menu. This command takes you to the Output Menu. See the summary of Output Menu commands in this manual.

Space - Pressing the space bar will return you to Immediate Mode.

Screen Menu Commands

The Screen Menu presents you with seven commands you can give to Extended Paint (see Figure 5).



```
<SCREEN MENU> Bars Cls(BW) Retrn
1PutBW 0GetBW 2PutCLR 3GetCLR
```

Figure 5: The Screen Menu

Bars - The Bars command puts a series of vertical bars on the black & white screen. This allows you to achieve a 192x64 colors-only image resolution, if you carefully specify your ink and paper colors. The first sample screen that follows Extended Paint on the tape uses this capability to achieve the background pattern.

Cls(BW)- Clears the black & white screen. No affect on the color screen. If you saved a black & white screen to high memory with the 1PutBW command, you can restore it with the 0GetBW command, even if you cleared the screen.

Retrn - Returns you to the Main Menu.

1PutBW - Put Black & White Screen. Stores a copy of the current black & white screen into high memory. This is a fail-safe feature that works in conjunction with 0GetBW. Perhaps you break into Extended Paint and accidentally corrupt the screen by listing the program. After returning to Extended Paint, the 0GetBW command will restore the last version of the black & white screen that you stored in high memory with the 1PutBW command. Also useful if you don't like how you've changed the black & white image when trying to resolve color clashes. The message "-- PutBW OK -- " appears at the bottom of the screen after Extended Paint completes the command.

Important: Extended Paint automatically performs the 1PutBW command whenever you specify any cassette operations through the Tape Menu.

0GetBW - Get Black & White Screen. Restores the last black & white screen stored in high memory with the 1PutBW command. The message "-- GetBW OK --" appears at the bottom of the screen. See the description of the 1PutBW command.

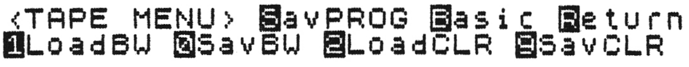
2PutCLR- Put Color Screen. Same as 1PutBW, except that the color screen, rather than the black & white screen, is stored in high memory. This command, in conjunction with the 9GetCLR command, allows you to experiment freely with different color combinations and patterns, while still allowing you to restore the color screen to its status at the time you issued the last 2PutCLR command. Extended Paint automatically executes this command when you load a color screen from cassette. The message "-- PutCLR OK --" appears at the bottom of the screen after the Extended Paint completes this command.

9GetCLR- Get Color Screen. Restores the last color screen stored in high memory with the 2PutCLR command. The message "-- GetCLR OK --" appears at the bottom of the screen. See the description of the 2PutCLR command.

Tape Menu Commands

The Tape Menu presents you with seven commands you can give to Extended Paint (see Figure 6).

> **Important:** Extended Paint automatically performs the 1PutBW command whenever you specify any cassette operations through the Tape Menu.



```
<TAPE MENU> SavPROG Basic Return
1LoadBW 0SavBW 2LoadCLR 9SavCLR
```

Figure 6: The Tape Menu

SavPROG- Save a backup copy of Extended Paint to cassette. The program saves in two sections, and you are asked to verify the save after the save is completed.

> **Important:** Extended Paint automatically performs both the 1PutBW and 2PutCLR commands whenever you specify the SavPROG command.

Basic - Exit Extended Paint and return to BASIC. Enter GOTO 5000 to reenter Extended Paint.

Return - Returns you to the Main Menu.

1LdBW - Load a black & white screen from cassette. If the black & white screen has low resolution colors, you can view the low resolution color scheme with the Main Menu's Refer command.

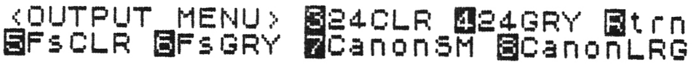
0SvBW - Save the black & white screen to cassette. You are asked to verify the save.

2LdCLR - Load a high resolution color screen from cassette. You can achieve some interesting graphics by loading a black & white image into the high resolution color screen. This works best with simple geometric objects, rather than with intricately-detailed images. Give it a try!

9SvCLR - Save the high resolution color screen to cassette. You are asked to verify the save.

Output Menu Commands

The Output Menu presents you with seven commands you can give to Extended Paint (see Figure 7). For all print options, the bright and flash attributes are not represented on the hardcopy.



```
<OUTPUT MENU> 324CLR 424GRY Rtrn
5FsCLR 6FsGRY 7CanonSM 8CanonLRG
```

Figure 7: The Output Menu

324CLR – Grey-scale print OF THE COLOR SCREEN ONLY to the TS2040 printer. Press the "s" key to abort the printing.

424GRY – Grey-scale print to the TS2040 printer, combining both the black & white and color screens. The image prints in eight sections, and requires 12 minutes to print. Press the "s" key to abort the printing. Crop marks appear on each of the eight sections, so you can trim and assemble them.

Rtrn – Returns you to the Main Menu.

5FsCLR – Grey-scale print OF THE COLOR SCREEN ONLY to a full-size Epson-compatible printer. Press the "s" key to abort the printing.

6FsCLR – Grey-scale print to a full-size Epson-compatible printer, combining both the black & white and color screens. The image prints in 12 sections (1 section per page), and requires 35 minutes to print. Press the "s" key to abort the printing. Crop marks appear on each of the 12 sections, so you can trim and assemble them.

Note: The grey-scale drivers for both the full-size and 2040 printers are designed to maximize the grey-scale reproduction of what's on the screen, rather than to win any awards for speed. If you have a 2040 printer available for use, I recommend that you use the 424GRY option rather than the 6FsGRY option, if only for the time savings. If you do choose to use the 6FsGRY command, try to avoid using a predominance of blues and blacks in your image (you can adjust this with the Hue command). Also, adjust the printer so that the first print line is as close to the top of the form as possible. Finally, you may wish to place your printer offline in the middle of the printing to give your print head a chance to cool down. When you put the printer back online, the printing will continue where it left off.

7CanonSM - This command prints a 2.25" x 3" full-color image of the screen to the Canon PJ-1080A, IBM Color JetPrinter, or Tandy CGP 220 color inkjet printers. The image takes two minutes to print. This, along with the 8CanonLRG option, is the most attractive output option. Press the "s" key to abort the printing.

8CanonLRG - Same as 7CanonSM, but a 4.5" x 6" image is produced. The image takes 4 1/2 minutes to print. Simply gorgeous! Press the "s" key to abort the printing.

Example: Enhancing a Graphic with Extended Paint

To give you some idea as to how to add colors to a black & white image using Extended Paint, here are the steps I took to create the Extended Paint title screen:

> **Note:** After Extended Paint loads and the screen clears, you can retrieve the title screen with the commands 9GetCLR and 0GetBW from the Screen Menu.

1. I first loaded the black and white image, with the 1LoadBW command on the Tape Menu.
2. Using the Pattern command, I filled the bottom third of the screen with the black, magenta, and cyan pattern. The pattern was accomplished by using the Pattern command three times, specifying a "3" in response to the "Step? " prompt, supplying offset values of 0, 1, and 2 in response to the "Offset? " prompt, and specifying the appropriate color each time.
3. I filled the bottom two lines of the screen with red paper, black ink, using the joystick.
4. I added the horizontal line above the last two lines of the screen with the joystick-- black paper, black ink. I used the same technique to add the horizontal lines above and below the "GRAPHICS SOFTWARE FOR YOUR 2068" text.
5. I colored the "GRAPHICS SOFTWARE FOR YOUR 2068" text with cyan paper, blue ink.
6. I colored the " © 1986 David A. Franson" text with yellow paper, red ink. Switching to black paper, black ink, I added the horizontal line below this message.
7. I moved to the top of the screen and applied the descending step pattern with the joystick.
8. I moved above the "GRAPHICS SOFTWARE..." text and applied the ascending step pattern as in step 7.
9. Finally, I colored the large area around the "EXTENDED PAINT" title with the joystick-- blue paper, yellow ink, and flash.

USING EXTENDED COLOR MODE IN YOUR OWN PROGRAMS

Using extended color mode, and the graphics created with Extended Paint, in your own programs is quite simple. You just have to keep several things in mind:

- MEMORY REORGANIZATION. Extended color mode requires that the 2068's memory be reorganized. There is a short loader program at the start of the Extended Paint cassette that loads and executes the machine code required to reorganize the system. To use this code, perform the following:

1. MERGE the BASIC loader program.

2. DELETE all the statements following the OUT 255,2 statement.

3. Add the following statements: FOR n=24576 TO 30719: POKE n,56: NEXT n.

   Note: The above statements are added because, when you first execute the code, the second display file (the color data) is filled with 0's. This corresponds to black paper, black ink; your screen is entirely black! The statements clear the color screen to white paper, black ink.

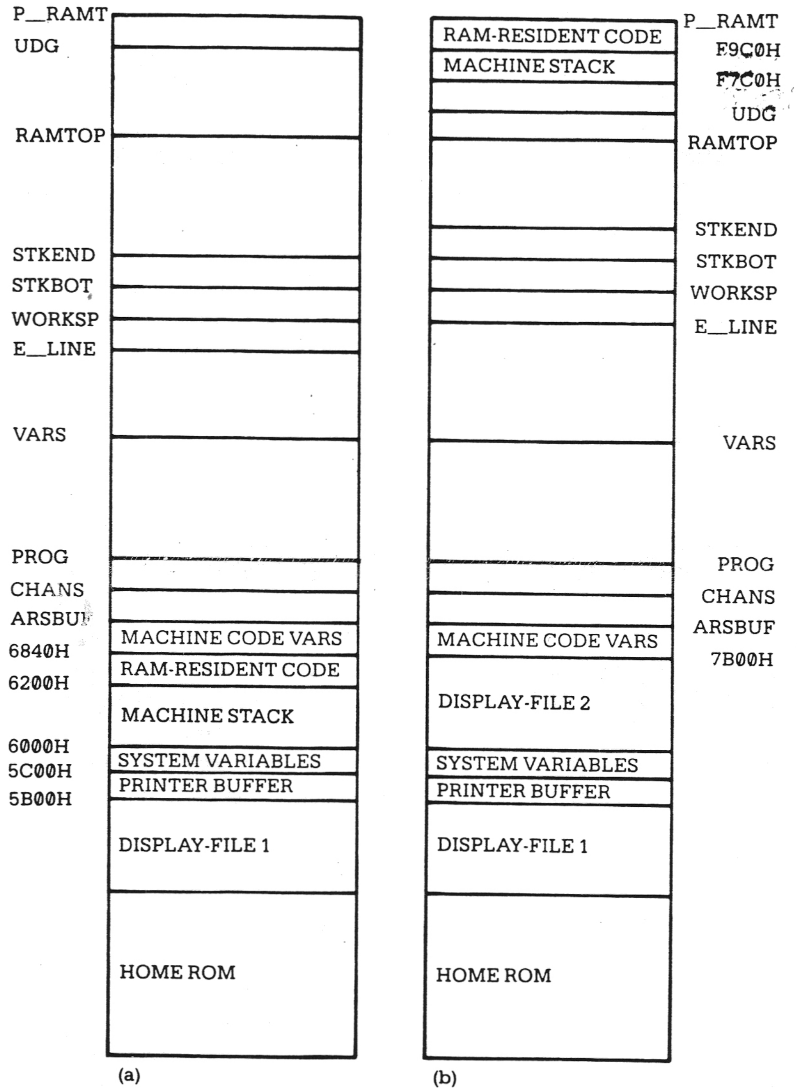
4. RUN the program. It loads the code and executes it, placing the 2068 in Extended Color Mode.

5. You can use the BASIC loader anywhere in your own programs. To save the code, SAVE "(name)" CODE 63217, 38. Once you execute the code, you no longer need it and you can use the memory used by the code.

- UNDERSTANDING MEMORY REORGANIZATION. Below is a copy of the chart found on page 254 of your 2068 User Manual. It depicts the Home Memory Map, when one display file is used vs. two display files used:

Home Memory Map

(a) One Display File (b) Two Display Files



In the case of the 2068 in extended color mode, display file two contains the high resolution color screen. Note the following memory reorganization when two display files are used:

1. The RAM-RESIDENT CODE and the MACHINE STACK portions of the system are moved to the top of memory, above the user-defined graphics.
2. The user-defined graphics (UDG's) are lower in memory than when in normal mode.
3. The PRINTER BUFFER and SYSTEM VARIABLES remain in the same place as in normal mode.
4. The MACHINE CODE VARS, ARSBUF, CHANS, and the start of the BASIC program are higher in memory than in normal mode, above the second display file.

- CONSEQUENCES OF THE SYSTEM REORGANIZATION. If you're going to do some extensive programming within the dual display file environment, you should note the following:

1. Since the second display file requires 6912 bytes, you have that much less free memory to work with.
2. If you're used to loading machine code routines to the top of memory, you must avoid that practice now, since such routines may overwrite the MACHINE STACK and RAM-RESIDENT code.
3. Use the system variables to find out exactly where portions of the system are located in memory. Your program should be "well-behaved." Don't use absolute addressing to access portions of the system. For instance, use the system variable PROG to find the start of the BASIC program and the system variable UDG to find the start of the user-defined graphics area.
4. When you're in extended color mode, the cursor (L, K, E, C, etc.) is no longer inverse and flashing. Since FLASH is an attribute and the system only recognizes the normal mode when assigning attributes to the cursor, the cursor simply appears as a "bare" letter. This makes it hard to identify the current line when listing a program, and you may want to switch back to normal mode with the statement OUT 255,0. You can return to extended color mode with the statement OUT 255,2. Note that even though you switched back to normal mode, the system remains reorganized as described above.

- LOADING SCREENS IN EXTENDED COLOR MODE. While in extended color mode, to load screens created with Extended Paint you must load the black & white and color images separately:

1. Load the black & white screen as usual with the command LOAD "" SCREEN$.

2. Load the color image with the command LOAD "" CODE 24576.

Note also that the system doesn't affect the color portion of the bottom two lines of the screen, as in normal mode. This means that you may not always be able to see the system messages at the bottom of the screen. You can avoid this problem in two ways:

1. Don't add extended color mode colors to the bottom two lines of the screen.

2. Enter OUT 255,0 "blind" to return to normal mode. The high resolution screen colors disappear , although they're still there if you return to extended color mode with the command OUT 255,2.

ATTENTION AERCO DISK USERS!! Tips on optimizing Extended Paint for the Aerco FD-68 disk system are available for a nominal charge from:

Joe Siciliano
2415 Burham St.
Pittsburgh, PA 15203